

Study Guide

For use with pages 299–304

GOAL Use proportions with scale drawings.**VOCABULARY**

A **scale drawing** is a two-dimensional drawing that is similar to the object it represents. A **scale model** is a three-dimensional model that is similar to the object it represents. The **scale** of a scale drawing or scale model gives the relationship between the drawing or model's dimensions and the actual dimensions.

EXAMPLE 1 Using a Scale Drawing

The distance on a map from Toronto, Canada, to Ottawa, Canada, is 9 centimeters. The scale is 1 cm : 25 mi. What is the actual distance between the two cities?

Solution

Let x represent the actual distance (in miles) between Toronto and Ottawa. The ratio of the map distance between the two cities to the actual distance x is equal to the scale of the map. Write and solve a proportion using this relationship.

$$\begin{array}{rcl} \frac{1 \text{ cm}}{25 \text{ mi}} = \frac{9 \text{ cm}}{x \text{ mi}} & \begin{array}{l} \longleftarrow \text{Map distance} \\ \longleftarrow \text{Actual distance} \end{array} & \\ 1x = 25 \cdot 9 & \text{Cross products property} & \\ x = 225 & \text{Multiply.} & \end{array}$$

Answer: The actual distance is 225 miles.

Exercise for Example 1

1. The scale of a blueprint is 1 in. : 3 ft. The actual length of the living room is 18 feet. Find the length of the living room on the blueprint.

EXAMPLE 2 Finding the Scale of a Drawing

A gardener is making a scale drawing of a garden. The length of the actual garden is 9 yards. The length of the garden in the drawing is 3 inches. Find the drawing's scale.

Solution

Write a ratio using corresponding side lengths of the scale drawing and the actual garden. Then simplify the ratio so that the numerator is 1.

$$\begin{array}{rcl} \frac{3 \text{ in.}}{9 \text{ yd}} & \begin{array}{l} \longleftarrow \text{Length of scale drawing} \\ \longleftarrow \text{Length of garden} \end{array} & \\ \frac{3 \text{ in.}}{9 \text{ yd}} = \frac{1 \text{ in.}}{3 \text{ yd}} & \text{Simplify.} & \end{array}$$

Answer: The drawing's scale is 1 in. : 3 yd.

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Exercises for Example 2

2. The distance between two cities on a map is 12 millimeters. The actual distance between the cities is 60 miles. Find the map's scale.
3. The length of a drawing of a fireplace is 10 inches. The actual length is 4 feet. Find the drawing's scale.

EXAMPLE 3 Finding a Dimension of a Scale Model

A model of a building has a scale of 1 : 40. The building is 100 feet tall. Find the height of the model.

Solution

Write a proportion using the scale.

$$\frac{1}{40} = \frac{x}{100}$$

\longleftarrow Dimension of model
 \longleftarrow Dimension of building

$$100 = 40x$$

Cross products property

$$2.5 = x$$

Divide each side by 40.

Answer: The height of the model is 2.5 feet.

Exercises for Example 3

4. A model of a boat has a scale of 1 : 15. The model's length is 2 feet. Find the actual length of the boat.
5. A model of a ladybug has a scale of 1 in. : 0.3 cm. The ladybug's actual length is 1.2 centimeters. Find the model's length.